In The Drawings

Corrected Figure 3 is attached.

REMARKS

Claims 1, 3-9, 11, 24, 28, 32 and 34-48 are pending. By the forgoing amendment, claims 1, 7, 8, 36, 39, and 40 are amended. Claim 44 is canceled. Support for the amendment to claim 1 can be found at page 4, lines 33-37, original claims 3 and 24, and elsewhere in the specification.

Corrected figure 3 is attached.

Examiner Interview

In the Interview of May 25, the undersigned attorney and Examiner Pasterczyk discussed the rejections and the cited art. The Examiner provided numerous helpful suggestions. The amendment to claim 1 was discussed, and, although the Examiner did not indicate allowability, he mentioned that the amended claim 1 would have a distinctly lower chance that it would be unfavorably received.

Rejections Under 35 U.S.C. §112, Second Paragraph

Claims 7, 8, 36, 39, 40, and 44 have been rejected under 35 U.S.C. §112, second paragraph.

Claims 7, 8, 36, 39, and 40 have been amended as discussed in the interview. Claim 44 is canceled.

Rejection Under 35 U.S.C. §103(a) As Being Obvious Over Dai in View of Greenway

Claims 1, 5, 7-9, 24, 28, 41 and 42 have been rejected as obvious over Dai, U.S. Pat. No. 6,251,280 in view of Greenway "Sensors and Actuators B, vol. 63, pp. 153-158 (2000). This rejection is respectfully traversed.

Dai discloses mesoporous sorbent materials that allow for selective binding of a template molecule. The uses for this system are described at col. 6, line 33 – col. 8, line 18. All of these uses are for sorbents.

Greenway discloses a microreactor using a Pd on silica catalyst.

The claimed invention is patentable over the combination of Dai and Greenway for several reasons. First, Dai is concerned with sorbent materials, they do not suggest a catalyst material. Therefore, Dai is nonanalogous art.

Second, there is not a proper motivation to combine the two references. Neither reference suggests any desirable outcome from combining these two references.

Finally, neither reference teaches or suggests an otherwise ordinarily molecular catalyst or procatalyst moiety immobilized on a solid support. Therefore, even if the cited references were combined, the claimed invention would not be obtained.

Accordingly, withdrawal of this rejection is respectfully requested.

Rejection Under 35 U.S.C. §103(a) As Being Obvious Over Gyraznov in View of Greenway

Claims 1, 3, 5, 7-9, 24, 32, 34, 39 and 40 have been rejected as obvious over Gyraznov, U.S. Pat. No. 4,394,294 in view of Greenway "Sensors and Actuators B, vol. 63, pp. 153-158 (2000). This rejection is respectfully traversed.

Gyraznov teaches a membrane catalyst made by disposing a polyorganosiloxane on a sintered powder metal substrate. The resulting sheet has a thickness of from 0.1 to 1.0 mm.

First, the combination of Gyraznov and Greenway does not create a *prima facie* case of obviousness because the cited references do not suggest any way in which Gyraznov's relatively large membrane structure could be mounted within the microchannel of Greenway. Nor is there any disclosure of how Gyraznov's membrane could be oriented within a microchannel. Could Greenway's device withstand sintering? Even if it could, would the subsequent steps of adding a polyorganosiloxane within the microchannel lead to clogging the microchannel? Alternatively, how could the Gyraznov's preformed membrane be inserted and oriented within a microchannel? Neither reference suggests such a complex procedure.

Secondly, neither reference suggests the desirability of placing Gyraznov's membrane into the microchannel apparatus of Greenway.

Accordingly, there is not a *prima facie* case of obviousness for combining these references.

Even if claims 1, 3, 5, 7-9, 24, 32, 34, 39 and 40 were *prima facie* obvious, they are all still patentable in view of Applicant's showing of unexpected results. The Examples section of the present specification shows multiple examples of unexpected results achieved by the present

invention. For example, in the case of the Knoevenagel Reaction, with a tethered catalyst in a microchannel, applicants observed superior results over both a conventional fixed bed reactor as well as a microreactor with a conventional catalyst. These superior results over both a conventional reactor and a microreactor using a conventional catalyst are surprising over the prior art. In the case of the Heck Reaction, with a tethered catalyst in a microchannel, applicants observed a 17.1% conversion after 3 hours residence time – when the same reaction was carried out over a tethered catalyst in a batch reactor, the reaction was much slower. This improvement in reaction speed is not suggested in the prior art. Similarly, in the case of the Michael Reaction, with a tethered catalyst in a microchannel, applicants observed surprisingly high yields with short residence times. As the Examiner is aware, a showing of unexpected and superior results establishes patentability of the claimed invention. See MPEP 716.02. Accordingly, withdrawal of the section 103 rejection is respectfully requested.

Claim 3 is additionally patentable because the cited references do not teach or suggest a tethered catalyst attached to a microchannel wall that defines a bulk flow path through a microchannel. Likewise, claim 24 is additionally patentable because the combination of Gyraznov and Greenway does not suggest a coating of a tethered catalyst composition on a wall of microchannel.

Claim 32 is additionally patentable because the cited references do not suggest a dendritic catalyst.

Rejection Under 35 U.S.C. §103(a) As Being Obvious Over Gyraznov in View of Greenway and Further in View of Gavriilidis

Claims 1, 3, 5, 7-9, 24, 32, 34, 39 and 40 have been rejected as obvious over Gyraznov, U.S. Pat. No. 4,394,294 in view of Greenway "Sensors and Actuators B, vol. 63, pp. 153-158 (2000) and further in view of Gavriilidis. This rejection is respectfully traversed for the reasons set forth above with respect to Gyraznov and Greenway.

Conclusion

If the Examiner has any questions or would like to speak to Applicants' representative, the Examiner is encouraged to call Applicants' attorney at the number provided below.

Respectfully submitted,

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By: _____

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